WHAT IS CLAIMED IS:

1. In a digital display system comprised of a multiplicity of individual pixels for providing a spot of light wherein the color and brightness of each of said pixels is determined by combining the "on" time of one or more digital bits for a display frame, a method of using non-standard bits to increase brightness comprising:

defining an output brightness dynamic range between a minimum level and a maximum level, said dynamic range comprised of a first portion and a second portion;

receiving an input signal, said input signal ranging from a minimum input level through a threshold input level to a maximum input level;

selecting a combination of digital bits from a primary group of digital bits in response to said input signal when said input signal is between said minimum input level and said threshold input level, and wherein said threshold level requires a combination of substantially all of said first group of bits;

selecting a combination of digital bits comprising at least one bit from a secondary group of bits and selected ones of said primary group of bits for brightness input signals between said threshold level and said maximum input level;

generating a selected output brightness level of a first pixel of said display within said first portion of said dynamic range in response to a combination of digital bits selected from said first group of digital bits and wherein said combination of selected digital bits are all selected from said digital bits of said first group; and

generating a selected output brightness level of a second pixel of said display within said second portion of said dynamic range in response to a combination of digital bits selected from both of said secondary digital bits and said first group of digital bits.

2. The method of claim 1 further comprising the step of providing digital bits representing at least three distinct colors of light to each pixel of the system.

3. The method of claim 2 further comprising the step of passing light through different colored sectors of a rotating color wheel to provide said at least three distinct colors of light

4. The method of claim 2 wherein the three distinct colors are red, green and blue.

5. The method of claim 2 further comprising the step of providing white light in addition to the three distinct colors.

6. The method of claim 2 wherein said step of providing digital bits representing at least four distinct colors.

7. The method of claim 3 wherein the secondary bits are at least one of transitional bits, pulse bits or sector bits of a color different than said three colors.

8. The method of claim 7 wherein said transitional bits are spoke bits.

9. The method of claim 2 wherein the secondary bits include pulse bits, and further comprising the step of calibrating the light output value during said pulse bits.

10. The method of claim 3 wherein said primary group of bits are at least 12 binary bits for each one of said three distinct colors, further comprising the step of providing said secondary discrete bits to the system as the color wheel transitions from one color to another color.

11. The method of claim 1 wherein said input signal requires a brightness output signal from said second portion of said dynamic range and further comprising the step of searching said group of secondary light bits to determine the source of said secondary light bits needed to generate the required brightness.

12. The method of claim 11 further comprising the step of turning on said determined source of said secondary light bits in response to said step of determining that light bits are needed from said source.

13. The method of claim 1 further comprising the step of switching individual mirrors of a digital micro-mirror device ON and OFF in response to digital bits to produce said multiplicity of individual pixels of said display.

14. The method of claim 13 further comprising the step of generating the brightness of an individual pixel of said display by the combination of bits switching said individual pixel ON during a display frame.

15. The method of claim 2 wherein the maximum value of said dynamic range represents the output brightness resulting from combining all digital bits available for a specific color in both said primary and said secondary group of bits.

16. The method of claim 15 wherein said secondary group of bits represents all available pulse bits and transitional bits available to generate said specific color and any sector bits of a color different than one of said three distinct colors.

17. The method of claim 2 wherein said secondary group of bits comprises bits for all three distinct colors and further comprises the step of mapping said discrete light over the entire color space volume.

18. The method of claim 2 further comprising the step of storing R, G and B output signals as a 3D grid of values in a 3D LUT covering the entire color volume and providing an output signal of a selected primary color in response to the input signal.

19. The method of claim 18 wherein said 3D LUT provides N^P storage locations wherein "N" is the number of bits making up the input signal, and "P" is the number of primary colors.

20. The method of claim 1 wherein at least three distinct colors of light are available and further comprising the steps of storing primary color values as a 3D grid of values covering the entire available color volume in a 3D LUT and determining an output primary color value for each of the distinct primary colors in response to the input signal.

21. The method of claim 20 wherein said step of determining a primary color value further comprises the step of inputting the intensity level of the three distinct colors as the input format to said 3D LUT.

22. The method of claim 21 wherein said three distinct colors are R, G and B.

23. The method of claim 20 wherein said step of determining a primary color value further comprises the step of inputting color ratios of the three distinct colors as input signals.

24. The method of claim 23 wherein said color ratios comprise selected ratios of the red, green and blue primary colors.

25. The method of claim 23 wherein the ratio of a first color "F" to a second color "S" is represented by the ratio F/S when the value of "S" is greater than the value of "F," and the raio S/F when the value of "F" is greater than the value of "S."

26. The method of claim 25 wherein the ratio F/S and S/F are merged into a single index value between "0" and "2," such that the ratio F/S is between "0" and "1" and S/F is between "1" and "2."

27. The method of claim 23 wherein said step of inputting signals comprises the step of inputting a first ratio F/S and its inverse S/F where "F" is a first color and "S" is a second color, inputting a second ratio T/S and is inverse S/T where "T" is a third color, and inputting a third signal representing the maximum one of the F, S, and T color values.

28. The method of claim 27 wherein said first color is G, said second color is R and said third color is B, such that the first ratio is G/R and R/G, the second ratio is B/R and R/B and the third signal is the maximum one of the R, G and B color values.

29. The method of claim 20 further comprising the step of mapping into said 3D LUT from three single dimension LUT's.

30. The method of claim 29 wherein said three single dimension LUT's include a red LUT, a green LUT and a blue LUT.

31. The method of claim 29 wherein said three single dimension LUT's represent a red gain (gR), a green gain (gG) and a blue gain (gB).

32. The method of claim 31 wherein said output primary color values will comprise a gain value and said step of mapping into said 3D LUT comprises mapping to a cube or volume of gain values of said 3D LUT and then determining a final gain value by Tetrahedral Interpolation.

33. The method of claim 32 further comprising the step of multiplying said input signal with said determined gain value.

34. The method of claim 20 wherein said three colors of light are produced by passing light through a rotating color wheel.

35. The method of claim 20 further comprising the step of making said secondary group of bits available for use when said input signal is above said threshold input level and requires a gain value in said 3D LUT that will generate an output brightness that is in said second portion of said dynamic range.

36. The method of claim 35 further comprising adjusting the defined output brightness dynamic range for each pixel depending on the available secondary color bits.

37. The method of claim 36 wherein said multiplicity of individual pixels of said display are produced by switching individual mirrors of a digital micro-mirror device ON and OFF in response to digital bits.

38. A method of generating a pixel of light for combining with a multiplicity of other pixels of light to form an image, each of said generated pixels of light having a selected color and intensity determined by the "on" time of a combination of selected color bits, said method comprising the steps of:

providing a primary group of digital light bits wherein the color represented by each bit of said primary group of light bits being one color selected from at least three colors and having a selected duration;

providing a secondary group of digital light bits wherein each bit of said secondary group of light bits represents one or more colors of said at least three selected colors and having a selected duration;

combining all of the available bits of said primary and selected bits of said secondary group of bits to determine the maximum possible output of said selected color of said pixel, said maximum possible output representing an enhanced output dynamic range of said pixel, said enhanced output dynamic range corresponding to a range of input signals between a minimal input level and a maximum input level, and said enhanced output dynamic range further comprising a first portion extending between an output of zero and an intermediate value, and a second portion extending from said intermediate value and said maximum value;

receiving an input signal defining a color level for each of said at least three selected colors;

selecting the appropriate light bits from said primary group of light bits in response to said input signal to generate said light pixel of said selected color when said output is in said first portion of said enhanced output dynamic range; and

selecting the appropriate light bits from said primary group of bits and said secondary

group of bits in response to said input signal to generate said light pixel of said selected color when said output is in said second portion of said enhanced output dynamic range.

39. The method of claim 38 further comprising generating a multiplicity of said pixels of light and combining said generated multiplicity of pixels to form an image.

40. The method of claim 39 further comprising continually repeating said method steps to form a series of different images.

41. The method of claim 38 where said at least three selected colors are provided by passing light through different color sectors of a rotating color wheel.

42. The method of claim 38 wherein said step of providing digital bits representing at least three distinct colors comprises the step of providing digital bits representing the colors red, green and blue.

43. The method of claim 38 wherein white light is provided in addition to the three selected colors.

44. The method of claim 41 further comprising the step of providing at least one of a transitional bit, a pulse bit and a sector bit of a color different than said three selected colors.

45. The method of claim 44 wherein the provided secondary bits are pulse bits, and further comprising the step of calibrating the light output value of said pulse bits.

46. The method of claim 41 wherein the three selected colors are red, green and blue.

47. The method of claim 41 wherein said primary group of bits are at least 12 binary bits for each one of said three selected colors, and further comprising the step of providing said secondary discrete bits to the system as the color wheel transitions from one color to another color.

48. The method of claim 41 wherein said secondary group of bits represent available pulse bits and all of the spoke bits available to generate said color.

49. The method of claim 48 wherein at least three selected colors of light are available and further comprising the steps of storing primary color values as a 3D grid of values covering the entire available color volume in a 3D LUT and determining an output primary color value for each of the three selected colors in response to the input signal.

50. The method of claim 38 further comprising the step of searching said secondary group of digital light bits to determine the source of said secondary light bits needed to generate said light pixel of said selected color and required brightness.

51. The method of claim 51 further comprising the step of turning on said source of said secondary light bits in response to said step of determining that light bits are needed from said source.

52. The method of claim 41 wherein said maximum output value of said dynamic range results from combining all digital bits available for a specific color in both said primary and secondary group of bits.

53. The method of claim 48 wherein said secondary group of bits comprises bits for all three distinct colors and further comprises the step of mapping said discrete light over the entire color space volume.

54. The method of claim 41 further comprising the step of storing R,G and B output signals as a 3D grid of values in a 3D LUT covering the entire color volume and providing an output signal in response to the input signal.

55. The method of claim 54 wherein said 3D LUT provides N^P storage locations wherein "N" is the number of bits making up the input signal, and "P" is the number of selected or primary colors.

56. The method of claim 49 further comprising the step of making said secondary group of bits available for use when said input signal requires a gain value in said 3D LUT that will generate an output primary color value that is in said second portion of said dynamic range.

57. The method of claim 49 wherein said step of determining a primary color value further comprises the step of inputting the intensity level of the three distinct colors as the input format to said 3D LUT.

58. The method of claim 49 wherein said step of determining a primary color value further comprises the step of inputting color ratios of the three distinct colors at the input signals.

59. The method of claim 58 wherein said color ratios comprise ratios of the primary colors red, green and blue.

60. The method of claim 58 wherein the ratio of a first color "F" to a second color "S" is represented by the ratio F/S when the value of "S" is greater than the value of "F," and the raio S/F when the value of "F" is greater than the value of "S."

61. The method of claim 60 wherein the ratio F/S and S/F are merged into a single index value between "0" and "2," such that the ratio F/S is between "0" and "1" and S/F is between "1" and "2."

62. The method of claim 58 wherein said step of inputting signals comprises the step of inputting a first ratio F/S and its inverse S/F where "F" is a first color and "S" is a second color, inputting a second ratio T/S and is inverse S/T where "T" is a third color, and inputting a third signal representing the maximum one of the F, S, and T color values.

63. The method of claim 62 wherein said first color is G, said second color is R and said third color is B, such that the first ratio is G/R and R/G, the second ratio is B/R and R/B and the third signal is the maximum one of the R, G and B color values.

64. The method of claim 49 further comprising the step of mapping into said 3D LUT from three single dimension LUT's.

65. The method of claim 64 wherein said three single dimension LUT's represent a red gain (gR), a green gain (gG) and a blue gain (gB).

66. The method of claim 65 wherein said output primary color values will comprise a gain value and said step of mapping into said 3D LUT comprises mapping to a cube or volume of gain values of said 3D LUT and then determining a final gain value by Tetrahedral Interpolation.

67. The method of claim 66 further comprising the step of multiplying said input signal with said determined gain value.

68. The method of claim 56 further comprising generating the output brightness dynamic range for each pixel depending on the available color bits.

69. A display system for forming an image by combining a multiplicity of light spots, each light spot having a selected color and brightness, said display system comprising:

a light modulator comprising a multiplicity of pixel members for selectively providing at least three selected colors in response to digital data bits from a primary group of bits and a secondary group of bits, each bit of said primary group representing one color of said at least three selected colors and having a selected duration and each bit of said secondary group representing at least one or more colors of said at least three selected colors and having a selected duration;

circuitry for determining an enhanced dynamic range of output gain of the color of a light spot by combining all available bits of said primary group and said secondary group suitable for generating said color of said light spot, said enhanced dynamic range having a first portion extending from a minimum value to an intermediate gain value and a second portion extending from said intermediate gain value to a maximum gain value;

an input signal defining a color and intensity level for each of said at least three selected colors;

circuitry for selecting the appropriate bits from said primary group of digital bits when said input signal requires an output value of said enhanced dynamic range from said first portion to generate light spots of selected colors and of selected intensity;

circuitry for selecting the appropriate light bits from said primary group of bits and said secondary group of bits when said input signal requires an output value of said enhanced dynamic range from said second portion to generate light spots of a selected color and of a selected intensity; and

a medium to receive light from said multiplicity of light spots and to display said image.

70. The display system of claim 69 wherein said light modulator is a multiplicity of micro mirrors that switch ON and OFF in response to said digital bits.

71. The display system of claim 70 further comprising a rotating color wheel comprised of sectors of said at least three distinct colors and a light source for projecting light through said rotating color wheel onto said multiplicity of mirrors comprising said light modulator.

72. The display system of claim 71 wherein said color wheel further includes a sector for passing white light therethrough.

73. The display system of claim 70 wherein said primary bits generate a spot of light as said projected light passes wholly through a distinct color of said color wheel, and said secondary bits generate a spot of light as said projected light passes through one or more adjacent distinct colors of said color wheel.

74. The system of claim 69 wherein said at least three selected colors are three colors selected from the group consisting of red, green and blue.

75. The display system of claim 69 further comprising a 3D LUT for storing primary color values for the entire available color volume to be applied to each of the distinct primary colors

and circuitry for addressing the appropriate output primary color value in said 3D LUT in response to the input signal.

76. The display system of claim 75 further comprising Dynamic Range Adjust circuitry for providing said secondary digital bits when said brightness input signal requires an output level that is in said second portion of said enhanced dynamic range.

77. The display system of claim 76 wherein said light modulator is a multiplicity of micro mirrors that switch ON and OFF in response to said digital bits.

78. The display system of claim 69 wherein said input signal requires an output value from said second portion of said dynamic range, and further comprising circuitry for identifying the source of said secondary light bits needed to generate said color level, and for providing said secondary light bits from said identified source.

79. The display system of claim75 wherein said 3D LUT comprises N^P storage locations where "N" is the number of bits making up the input signal, and "P" is the number of primary colors.

80. The display system of claim 75 wherein the input format of said 3D LUT is the intensity level.

81. The display system of claim 75 wherein the inputs to said 3D LUT includes color ratios, and further comprising circuitry for receiving said input signals and generating color ratios therefrom.

1 82. The display system of claim 81 wherein said color rations comprise ratios of the primary
2 colors red, green and blue.

1 83. The display system of claim 81 wherein a first input comprising a first ratio F/S and its
2 inverse S/F where "F" is a first color value and "S" is a second color value, a second input
3 comprises a second ratio T/S where "T" is a third color value and a third input represents the
4 maximum signal of the F, S and T color values.

1 84. The display system of claim 83 wherein said first color is green, said second color is red
2 and said third color is blue.

1 85. The display system of claim 75 further comprising three single dimension LUT's for
2 mapping into said 3D LUT.

1 86. The display system of claim 85 wherein said three single dimension LUT's comprise a
2 red LUT, a green LUT and a blue LUT.

1 87. The display system of claim 85 wherein said three single dimension LUT's represent a
2 red gain (gR), a green gain (gG) and a blue gain (gB).